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Release and Recovery of Trapped Fullerenes through the Use of Organic Acids

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Samples of the recently discovered metallic nitride fullerenes (MNFs) are in high demand for application development due to their interesting chemical and physical properties. The "Stir and Filter Approach" (SAFA) effectively purifies the most chemically inert MNF (e.g., Sc3N@Ih-C80) due to its lack of reactivity with diaminosilica, the separation medium. The problem, to date, with this separation method is an irreversible binding of empty-cage fullerenes (e.g., C60, C70, C84) and the more reactive MNFs (e.g., Sc3N@C68, Sc3N@C78, Sc3N@D5h-C80) to the silica. In lieu of discarding the spent SAFA silica to waste, we have instead developed a novel method for releasing the trapped fullerenes. The recovered fullerenes can then be re-used in subsequent purification methods for the isolation of more MNF samples. In this presentation, we will discuss specific procedures for removing the fullerenes from the spent silica which includes the utilization of an array of organic acids. We will also describe the selective release chemistry based on the effect of the different acids.